FIJI

IMPLEMENTATION OF ICT IN TEACHER TRAINING

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BACKGROUND

The Land

Fiji is an archipelago of more than 300 islands scattered across 650 000 square kilometres of ocean. It has a total land area of 18 343 square kilometres, much of which is hilly and mountainous. The scatter of islands and rugged terrain have been serious constraints in the development of basic infrastructure and facilities for transportation, electricity and telecommunication needed for basic services such as health and education. The same factors coupled with high tariffs have also hindered the integration of information and communication technology (ICT) in education policies and practices.

Infrastructure

In the last few years there has been a notable turnaround as the government has demonstrated political will in meeting these pre-conditions. Roads and transport facilities have opened up rural areas, telecommunication links have reached out to outlying islands and remote communities, and electric power lines have been upgraded in both semi-urban and rural communities.

Telecom Fiji Limited (TFL), which holds the monopoly on the provision of telecommunications network services has been proactively expanding its services and improving access.

- Its EasyTel system, which is a wireless local loop telephone service delivered by Code Division Multiple Access (CDMA) technology, has additional facility allowing it to operate without a telephone connection, and simultaneous connection to telephone, Internet, or fax without undermining the quality of service.
- A bigger satellite project costing in excess of $45 million in capital and operating expenditure over the next 10 years started last year. Several satellite-based services have been rolled out from a central hub station to numerous sites already identified in areas previously inaccessible, while many more sites will be installed in the next year or so to replace and improve old terrestrial systems.
- Telecom Fiji intends to address the digital divide that exists for rural and island communities, and bring services such as “Internet access, television capability, virtual classrooms for schools, rural medicine, rural banking, and communication backup for cyclone emergencies”.
- The company's latest announcement to reduce tariffs has been gladly welcomed.
The School System

Education in Fiji's school system is a partnership between government and the communities, and the relative location of most schools is an indication of the significant involvement of the communities. Most primary schools are located close to local settlements and villages while secondary schools tend to be located around the urban and peri-urban areas. The latter created problems for rural dwellers and became a strong factor towards a rapid urban drift.

An Education Commission in 1969 acknowledged the need of rural dwellers for post-primary education and recommended the establishment of junior secondary schools closer to rural areas. The schools were very popular and taught Form 1 to Form 4 subjects. Over the years these schools developed further and increased capacity to become full-fledged secondary schools. Today Fiji's school system comprises:

- over 700 primary schools,
- around 20 junior secondary schools, and
- 156 secondary schools.

An important point of consideration regarding this distribution is that the government owns only 2 primary schools and 12 secondary schools. Local committees, especially religious organizations, manage the rest.

NATIONAL ICT POLICY

The Vision of the National ICT Strategy Plan is "To develop Fiji into a vibrant and dynamic Pacific ICT capital with a thriving digital economy and empowered citizens". The ICT goal is "universal access to internationally competitive ICT services". The four cornerstone programs that define the National ICT Strategy Plan are:

- E-Government (ITC Services)
- E-Commerce (Ministry of Commerce)
- E-Personal (Ministry of Education)
- ICT Industry (Fiji Trades and Investment Board)

The government has always acknowledged the potential in ICT to provide greater opportunities in education and development in the country. Its eGovernment Strategic Plan noted the limited links available to education facilities, and its priority for Year 2 (2003) was to develop technology infrastructure, which was to include links to schools and the implementation of database systems. This phase is well on the way.

At the Ministry of Education, specific objectives in its Strategic Plan that concern the exploration and implementation of technology are being realised:

- a ministry website has been developed,
- a network system linking all sections of administration is being planned, and
- links to the schools are being negotiated with stakeholders.
ICT IN EDUCATION

Computer Studies (CS) is the ICT related subject in the formal school curriculum. The course was developed in 1993, piloted in 1996 and implemented in 2002. The curriculum is only for Forms 5, 6 and 7. It is not a core subject and while 74 secondary schools (50%) opted for it the first time, the number increased to 86 (55%) in 2003.

Computer Science (CS) Curriculum

The CS curriculum emphasises the computer as a tool. The Course Outline for form 5 and form 6 shows 6 Units, each one having both a theory and practical component as follows. Units 1 through 3 is taught in form 5 and followed by Unit 4 to 6 in form 6.

Unit 1T - Structure & Functions of a Computer
Unit 1P - Using the Computer
Unit 2T - History of Computers
Unit 2P - Word Processing
Unit 3T - Computers and Information Processing
Unit 3P - Information Processing
Unit 4T - Programming
Unit 4P - Programming
Unit 5T - Computers in Society
Unit 5P - Spreadsheet
Unit 6T - Computers & Careers
Unit 6P - Intermediate Concepts & Optional Applications

There have been discussions to introduce Computer Studies earlier at Form 3. While there is no national curriculum below form 5, a few schools have developed their own for forms 1 to 4. Fewer than 5 primary schools have computers and do computer studies.

In 2003 Williams, Kato and Khan carried out an extensive evaluation of the CS curriculum. The team visited the 86 schools offering CS and collected information from teachers and students, and observed infrastructure and equipment. They also interviewed several employers and agencies. Baseline data was obtained from government ministries.

We will refer to some findings of that study in this report.

- The team sought the views of CS teachers and students, academics as well as agencies about the curriculum. The majority view from students and teachers was that the curriculum was too theoretical and provided little opportunity for useful hands-on experience. The employers and agencies suggested a more dynamic approach that included ongoing training in IT for teachers as well as greater awareness of user knowledge. The academic view from the University was that the curriculum lacked background in algorithmic thinking, problem-solving and specific IT knowledge such as base 2 or Boolean logic. The unanimous view was that the objectives of the curriculum were outdated and needed revamping.
CS Teachers

In our secondary schools, every teacher is required to be able to teach two or more subjects. Since CS is a late addition to the curriculum, a diploma in CS is the stipulated minimum requirement for teaching the subject at secondary school. Unlike other subjects, there is no requirement for a teaching qualification. The scarcity of qualified CS/IT personnel has seen teachers without CS qualifications teaching these courses in schools.

- An interview conducted of some 44 teachers who taught CS (Williams et al., 2003) found that 81% have CS/IT background, and that about 60% of them taught either Mathematics or Accounting as their second subject. Most (77%) of them studied in Fiji, with the highest graduates from the University of the South Pacific (55%) and the Fiji Institute of Technology (24%).

- Further analysis of the CS teachers found that there were slightly more male (59%) CS teachers than females (41%), and more Indo-Fijian CS teachers (80%) than Fijians (18%) amongst others. Most of the teachers are young and new to teaching. These patterns are important when viewed alongside student enrolments.

Student Enrolments at School and Tertiary levels

- An analysis of students taking CS/IT courses in schools found that there were slightly more female (54%) than male (46%) students. Interestingly at tertiary level (University of the South Pacific), the trend had markedly gone in the opposite direction. Enrolment figures show that the number of female students carrying CS/IT as first or second major is much lower (26%) than males (74%).

- An analysis of student enrolment by ethnicity in 2002 found that at Form 7, about 70% CS students are Indians, 24% Fijians and the rest is other groups. This is expected since 66% of Form 7 in that year is Indians and 31% Fijians.

Internet Access

The computers that are in schools have either been purchased by the school committees themselves or donated by government, aid agencies, NGOs or private institutions. The trend is set to continue. Of the 86 secondary schools that teach computer studies, most have more than 20 computers and a few have small LAN networks with a server facility for sharing information and Internet services.

Internet access varies widely in Fiji. The World Telecommunications Development Report published by ITU in 2002 showed that Fiji has 610.05 Internet users per 10,000 population.

- The Williams et al (2003) review showed that only 35 schools have Internet connections. Internet services continue to be used mainly by teachers, while usage
by students varies between schools. In the main, students' use is minimal, are for specific projects and always under teachers' supervision.

- The review also highlighted additional aspects of students' and teachers' computer backgrounds. Firstly, 50% of the teachers had a PC at home and 16% had Internet access; one teacher has a personal Web page. Compared to that, a higher 46% of students had Internet access at home. An analysis of Internet access by ethnicity showed that 60% of the students and 86% of the teachers with Internet access were Indo-Fijians. High costs and a lack of infrastructure were the most popular reasons for limited access. It would seem that students doing CS/IT tend to have better IT skills and have greater access to the Internet than their teachers.

**TEACHER TRAINING PROGRAMMES**

Fiji has six main teacher education institutions. The following five run programmes for pre-service teachers:

1. The University of the South Pacific (USP) is a regional institution serving 12 independent island countries, and is located in Suva the capital of Fiji. This institution is Fiji's largest provider of graduate teachers for secondary schools. (Its Bachelor in Education Primary programme is *in-service* and will be fully externalised from 2006);
2. The Fiji College of Advanced Education (FCAE) is a government institution that is located also in the capital, Suva. The institution provides graduate teachers for the junior secondary schools and lower forms of secondary school;
3. Lautoka Teachers College (LTC) is also a government institution and is the largest provider of pre-service primary teachers;
4. Fulton College is owned by the Adventist Mission and serves its regional centres including Fiji with a diploma and a degree programme for primary teachers;
5. Corpus Christi is owned by the Roman Catholic Mission and provides a pre-service programme for primary teachers;

All programmes in the five institutions including those of the USP have undergone restructuring and revisions to accommodate the changing needs of Fiji's education system especially the need for specialist computer teachers and technicians to teach CS/IT, as well as computer literacy for all teachers.

At the present time, the USP is the only institution that has a well developed ICT network system that extends to its use in education. Three of the other four currently have no systems network, only stand-alone terminals with a dial-up facility in libraries for the use of lecturers and trainees. Their internet access is poor. Still, teacher educators we spoke to seem poised to prepare a new generation of teachers to effectively use the new technologies in their practices and prepare students effectively for the new information age. We will now look at the programmes and ICT provisions at each institution.
Table 1 summarises the major ICT elements in each programme.

**University of the South Pacific**

The strategic location of the University of the South Pacific in Suva, Fiji, has been of immense benefit to the country for many obvious reasons. The University has been at the forefront in the use of ICT in education. Its private telecommunications network, USPNet, bridges the vast distances between the main campus in Suva and the 12 Centres in the region. The network provides for the opportunity to participate in audio tutorials conducted from any of the three campus (Laucala in Suva, Emalus in Vanuatu and Alafua in Samoa), communicate by email, access the World Wide Web, watch a live video broadcast of a lecture from any of the three campuses, and take part in video conference (and tutoring) with the main campus in Suva. Video Broadcasts provide the transmission of live or pre-recorded course material from any of the three campuses, to be received at any regional USP Centre. Lectures can be broadcast real time with audio feedback from students. Video Conferencing is used mostly for tutorials and discussion groups.

It goes without saying that all staff and students of the University are informed of these technologies and have access. Students in Fiji generally enjoy better reception and less bandwidth problems than their counterparts in the other countries of the region.

Teacher training is under the Department of Education and Psychology. The department currently offers four alternative routes to graduate status and qualified teacher status. Of these, only the BA/BSc Graduate Certificate in Education (BA/GCED or BSc/GCED) programme is pre-service. This programme is fairly new. It is a concurrent four-year programme which allows students to major in two teaching subjects and, at the same time, obtain qualified teacher status (USP Calendar, 2005). In previous programmes, it was mathematics major students who received basic training in computer programming and the use of software packages as part of their mathematics degree; these graduates would end up teaching computer related topics in schools.

The new BA/BSc GCED programme allows for all trainees access and experience with the new computer technologies as a tool. Trainees who intend to teach Computer Science in the schools are required to take Computing Science/Information Systems courses (coded CS) along with the courses of their second teaching subject. The major academic ICT components for this group of trainees are:

- 8 specialist CS courses that provide in-depth knowledge and skills of the area, and
- 2 Curriculum Studies courses where trainee CS teachers learn technology-integrated pedagogy.

The details of these components are described in Table 1.
Teaching Methodologies

The Computing Science/Information Systems courses are offered in one or a mixture of modes:

- online (using WeBCT and CD Roms),
- video broadcast (using video broadcast and WebCT),
- distance and flexible learning (using print and audio tutorials) or
- on-campus (using WebCT or Class Shares). Class Shares is a non-interactive facility that lecturers use to upload lecture notes onto the system for students' use.

There is now a shift in pedagogy towards a blended approach that uses a mix of the available technologies. Online or eLearning is expected to be the teaching & learning mode of the next decade.

The Curriculum Studies I and II courses (see Table 1), like most Education courses, use the computer-mediated WeBCT as media for learning. Altogether therefore, the teacher graduates of USP should have reasonable grounding in a wide variety of technologies as administrative tools as well as integrated into pedagogy.

Fiji College of Advanced Education

The Fiji College of Advanced Education provides a pre-service programme for Junior Secondary teachers and teachers of lower Secondary (Forms 1 to 4). The programme is for two years and students must complete two subject majors and satisfy Practicum components before they graduate with a Diploma in Education.

Two of the College's ten schools provide computer-related courses.

- The School of Mathematics and Computer Science offers Computer Literacy course (COD) to all Year 1 trainees. The course aims to provide trainees with the basic computer knowledge and skills. Teachers need to be able to use the computer as a tool and learning aid in the classroom. Course content includes covered basic computer operation and care, word processing, spreadsheets, database, educational software, and computer applications.

- The School of Education offers an Instructional Material Development (IMD) to all Year 2 trainees. The course introduces students to the design, production and application of various materials in relation to media resources for teaching and learning. Information technology components range from print technology such as use of blackboard to the simple audiotapes and videotapes.

Most of the other schools use computer hardware and a wide range of software in different ways in their classes. The various software used by the individual schools is indicated in the following list.
• Mathematics – Programming & loaded software
• Accounting – Computers in Accounting & loaded software
• Industrial Arts – Computer aided design
• Music – Using computers for composing music (3 weeks duration)
• Science – Encarta 2000 version loaded for science trainees
• Social Science – Mapfacts software loaded
• English – CD Roms available in the library
• Pacific Studies – Video Broadcasting (40% course)

Internet access at FCAE is a stand-alone terminal with a dial-up facility in the library for the use of the trainers only. Teacher trainees do not have access.

Lautoka Teachers College

Lautoka Teachers College is the country's largest pre-service provider of primary teachers. The College's recently went through an upgrade of facilities and a restructuring of its programme of study. New building facilities include two computer laboratories, one of which is already in use while the other will be ready later in the year. The laboratory that is currently in use houses 20 computers which are networked to a Server, and attempts are being made to extend the link to include other sections of the College such as Student Administration and the Library.

A restructuring of the College's curriculum has resulted in the upgrade of its programme from a Certificate level to the current Diploma in Primary Teaching. The College's 2005 intake of students was the first for the two-year Diploma programme. The upgrade of facilities and programme at the College is part of an Australian government Overseas Aid programme that is managed by AusAID.

In line with the Ministry of Education's requirement for computer literate teachers, the College has developed two computer-literacy courses, Computer Education I and Computer Education II, as core courses offered in the first year of the Diploma programme. The courses provide basic computer literacy and skills, which help trainees in their assignments and laboratory work. CE I covers Basic Word Skills, MS Word, Excel, Microsoft Outlook etc while CE II is slightly more advanced. The courses are taught by two technicians who have been specifically trained by the AusAID Consultants, but the administration of the Computer courses remain with the Head of the Mathematics.

As the College awaits the Ministry of Education to approve access to World Wide Web and email facilities, it is providing its students with a wide selection of educational software programmes such as Encarte 2004, which students can use for most of their knowledge search requirements. For the purposes of micro-teaching and Practicum, students have access to digital cameras and video recording equipment. While staff use multimedia for lectures, trainees are trained and encouraged to use power point in their seminars and other presentations.
Fulton College

Fulton College runs two pre-service teacher training programmes for primary teachers:
  • a Diploma in Education and
  • a Bachelor in Education.
While the common progression is for the graduates of the Diploma programme to proceed towards a degree, there is provision for direct entry into the degree programme.

The College has two large computer laboratories each one housing 30 computers. All computers are linked to a large server, which is maintained by a specialist IT personnel. The College has access to Internet and the World Wide Web, and all staff and students have their own College email address. Teacher trainees make up about 40% of the College's student population.

Like the other providers, Fulton College has two computer-related courses, which are core courses for all trainees.

  1. "Introduction to Computing" is a basic computing course offered at Year 1.
  2. "Technology in Education" provides insight into the ways teachers can integrate technology applications into their classrooms. It is a core course and is offered in the first year of the degree programme.

In addition to Internet access, the College also offers a wide variety of software programmes for the use of staff and students. Students are assisted to gain experience and competence in computer-mediated technologies such as multimedia and power point.

Corpus Christi College

Corpus Christi College is a pre-service teacher training institution for primary school teachers. Trainees at the college come from Fiji and other Pacific Islands. At the end of three years they graduate with a Certificate in Primary Teaching. There is no ICT programme at the College. Many trainees are computer literate and they train their colleagues who do not have computer skills. Computers are made available to students for typing of assignments and use of CD Roms and discs. The only software loaded in two of the seven computers is Encarta.
<table>
<thead>
<tr>
<th>Programme &amp; ICT Courses</th>
<th>Purpose &amp; Course components</th>
<th>Delivery Mode</th>
<th>Types of technology used</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>University of the South Pacific</strong></td>
<td></td>
<td></td>
<td><strong>VBC</strong></td>
</tr>
<tr>
<td>BA PGCE or BSc PGCE [CS major]</td>
<td>* CS courses develop trainees' knowledge and skills in various areas of Computing Science/Information Systems including computer programming, programme design, information systems and networking, and data management.</td>
<td></td>
<td><strong>eLearning</strong></td>
</tr>
</tbody>
</table>
ANALYSIS/RECOMMENDATIONS

1. Accreditation System

As yet, Fiji has no national accreditation system even though there is work in progress towards establishing it. In teacher education, while Fiji is fortunate in having 5 institutions preparing pre-service teachers, there are no guidelines to accredit, control and monitor the courses and qualifications of the institution that lead to teacher registration. This is an urgent need. The experience of Accreditation agencies and Teachers Councils in Australia and New Zealand should provide useful guidelines.

2. National ICT Standard

There is no national standard in CS/IT curriculum in Fiji. Likewise, there are no established indicators for IT use in education. Both items are crucial for setting up standards against which curriculum development and review will reflect the needs of society and its IT environment. It is important to consider the need to relate and staircase the secondary CS curriculum to the tertiary IT course(s). At the same time, it is important that teacher training providers prepare teachers well for the specific environment in the schools.

At a Pacific regional "ICT in Education" workshop, participants raised concern about the lack of personnel and agencies to repair computer hardware. They requested that trainees be trained as teacher-technicians.

4. Capacity Building

Technology in Fiji like everywhere else is changing rapidly. There is no doubt that teachers have to acquire new knowledge and skills almost daily. For this to happen, there is need to strengthen capacity at central administration. The lone CS officer at the Ministry of Education is disappointing and should be strengthened markedly. They should have Internet access. It is also important that a support/knowledge network be established amongst interest groups of teachers, Ministry officials, training providers and others for building capacity.

5. Greater Access

The number of schools (50%) opting to take CS is too low and support is required to facilitate greater access. Since funding is an issue and the greater number of school committees do not have the funds to purchase and maintain IT equipment, the following options are suggested:

- Government to negotiate prices and supply;
- Shared facilities between cluster schools in districts and communities;
- Community telecentres
6. Integrated approach to ICT in education

The problem of IT teacher shortage will remain with us for a few more years. The current CS curriculum in school has been found limiting. Meanwhile, ICT continues to become integrated with all areas of study. Taken these elements into consideration, Williams et al (2003) suggest "a more inclusive ICT approach to optimise opportunities (p. 52)." Their proposal for "seamless usage of ICT in all subjects" made sense. We think that teacher training providers are the best people to take this on board in their programmes. It is not only cost-effective but is also pedagogically sound.

7. Distance Education

The USP is the only provider that is into distance education. It has been a pioneer in distance and flexible learning (DFL) and teaching since the 1970s. It is the core pedagogical concept informing the university's teaching and learning realm, and flexible learners make up about sixty percent (60%) of enrolments. The university is multimodal using print as well as computer-mediated teaching modes.

In the school system, the Schools Broadcast Unit has been running programmes for close to 50 years. The Unit produces and disseminates a wide range of audio and video programmes and resources to supplement teaching and learning in both primary and secondary schools. An important component of this is a regular two-hour broadcast that it provides three times a week, which covers topics in Social Science and General Knowledge for primary schools.

It is ironic that none of the primary teacher education institutions use radio broadcast as a learning tool, nor prepare its trainees for the broadcast programmes. Radio broadcasting in the country is well established, up-market and competitive, and airtime for school broadcast is an important component of commercial broadcasting. We believe that it is a viable mode of learning that deserves greater recognition and support by the ministry and training providers.

CONCLUSION

Government has a strong National ICT Plan, which is unfolding well. It has been working in partnership with local subsidiaries such as the Telecom Fiji Limited and the Department of Energy (Rural Electrification), as well as overseas aid agencies such as the European Union, AUSAID and JICA to develop infrastructure, upgrade and improve existing facilities, and build capacity.

Government has also actively scrutinised the telecommunication industry especially the existing monopolies. In a recent media release, Telecom Fiji indicated its compliance with a Commerce Commission determination to reduce tariffs. If all goes well, this will take effect from June 2005. A proposed reduction by an average 55% is seen as the first
step towards liberalising the telecommunications industry and bringing in competitive services. At central administration, the ITCS that is the official government department for providing ITC services, recently put out a tender for an Internet Design & Implementation Solution for the Government of Fiji wide area network (GOVNET). This design solution will have implications for the development and subsequent hosting of e-government web applications of the Ministry of Education.

The implementation of ICT in Fiji's education system relies greatly on the readiness of the Ministry of Education to develop and guide a national approach. Activity up to now has been fragmented with individual institutions working in isolation. There is an urgent need for more collaborative activity between all stakeholders so that a systematic plan and subsequent development can be effected. We suggest consultation and central direction as the best strategy. This, however, requires a strong ICT Education Unit at the Ministry to find innovative ways to build and strengthen partnerships that support a shared vision and objective. It must also ensure a long-term commitment from all providers.
NOTES

1. USPNet  http://www.usp.ac.fj/index.php/uspnet0/  
2. USP 2005 Caendar  
   www.itc.gov.fj/docs/Data3eGovtStrategicPlan.pdf  